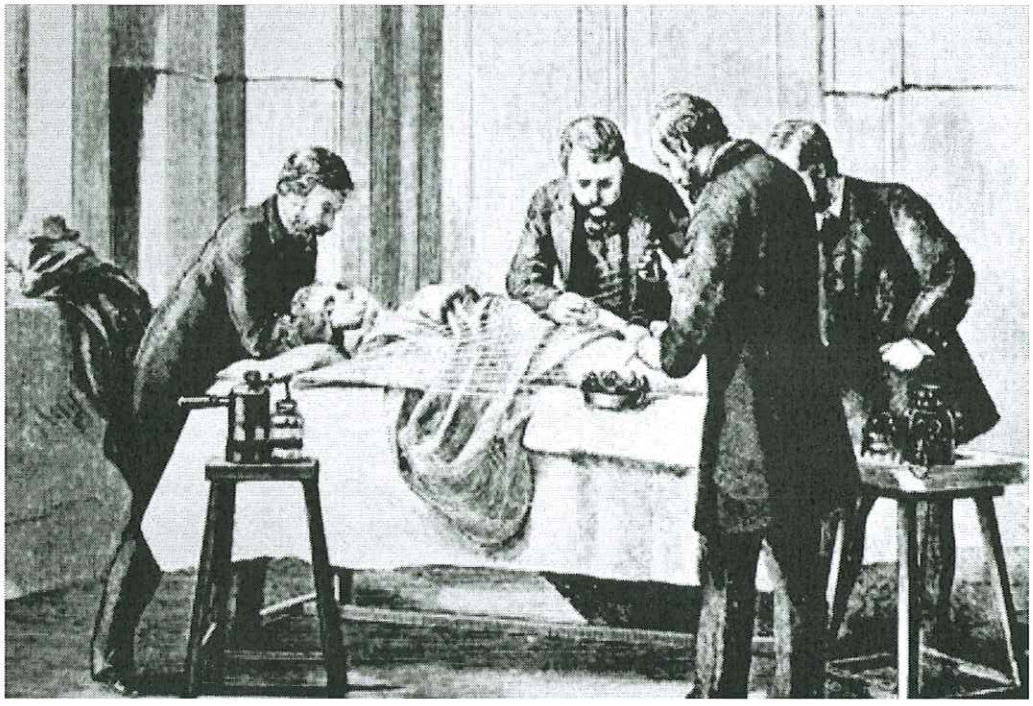
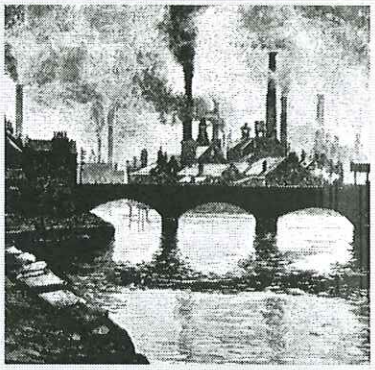
Theme 3:

Medicine in the 18th and 19th Centuries, c.1700-1900



Background:

- The **Industrial Revolution** took place in Britain in the 18th and 19th centuries. Technology advanced rapidly and the population more than doubled.
- Cities became **overcrowded** and **disease-ridden**, which made it even more important to try and understand what caused disease and illness.
- The Church continued to have less influence than before.
- **The Enlightenment** was a movement in Europe in the 1700s which promoted the idea that people could **think for themselves**, without control from authorities like the Church and nobility.
- There was a **Scientific Revolution**. New scientific ideas began to replace the old ones.



Ideas about Causes of Disease

- Spontaneous Generation

This was a new theory developed in the early 1700s, which said that **microbes were created by decaying matter** (e.g. rotting animals or food). It seemed logical because scientists were able to see microbes through microscopes.

In actual fact **microbes are the cause of decay**, *not* created by it.

- Germ theory

Germ theory was published by French scientist **Louis Pasteur** in **1861**. He proved that spontaneous generation was wrong, and that **something in the air** must cause decay.

Pasteur realised that if germs caused decay, then they might also cause disease. However, germ theory had **almost no impact** initially, for several reasons:

- Spontaneous generation was still promoted by influential doctors.
- Pasteur was not a doctor, and his work mainly looked at decay and spoiled food.
- Doctors observed bacteria all over the body, even in healthy people, so it seemed impossible that they could cause disease.
- Because Pasteur hadn't been able to identify the specific germs that caused different diseases, germ theory seemed to have little practical use in treating disease.

Robert Koch, a German scientist, was the first to identify the different microbes that caused disease. He discovered the bacteria that caused **anthrax** (1876), **tuberculosis** (1882) and **cholera** (1883).

Koch made it easier for other scientists to study bacteria, because his method - **growing bacteria in jelly, colouring them with dye and photographing them under the microscope -** was used by others.

Koch had a big advantage - he received funding from the German government.

- Miasma

Despite new discoveries such as germ theory, many still believed in **miasma** until the late 1800s.

London's sewage was emptied straight into the Thames, and this caused the **Great Stink** in **1858**. Because this foul smell happened during a particularly hot summer, it seemed to fit in with the old theory that miasma was absorbed in the soil and released during warmer weather.

Tick the correct boxes to show whether the statement refers to Pasteur, Koch or both.

	Pasteur	Koch
Disproved the theory of spontaneous generation.	✓	✓
Identified different bacteria that caused diseases.		
Developed a method of growing bacteria in a solid jelly.		
Published his theory in 1861.		
Used purple dye to make bacteria easier to see under the microscope.		
Had little impact on medicine initially, because most doctors took no notice of his discovery.		

Apart from miasma, many older ideas about the causes of disease had now died out: people **no longer** believed in the **Four Humours**, or that **God** sent disease as a punishment. In general, society was more keen to look to **scientific explanations** when it came to medicine.

Approaches to Treatment

- Hospitals

Many hospitals had closed down when Henry VIII closed the monasteries in the 1530s. **By 1700 there were only five hospitals in England.**

A few new hospitals in the 1700s were funded by **donations** from wealthy businessmen and lawyers. However, most rich people themselves preferred to be treated in their own homes.

Hospitals now **focused more on treating people**, rather than just being places to rest and pray. Doctors visited patients regularly and apothecaries mixed treatments on site.

Hospitals tended to admit the **"deserving poor"** – respectable, working-class people who people thought deserved to be treated. For the first time, poor people had access to trained doctors.

The government also provided **workhouses** for those who were too poor to support themselves. These usually contained infirmaries where medical care was given.

However, as more people started to use hospitals, they became **less sanitary** (less clean). There were **separate wards** for infectious patients, but doctors would often go between wards and patients without washing or changing clothes.

Give one way in which hospitals had changed by 1700, and one way in which they were the same as before.

Florence Nightingale helped to transform hospital care in Britain.

In **1854**, she and a team of 38 nurses were **sent by the government** to treat British soldiers in the **Crimean War**. The British army hospital at **Scutari** was dirty, smelly and had a high death rate. Nightingale was an effective organiser and administrator. She focused on:

- Thoroughly cleaning the hospital
- Providing clean clothes and bedding

- Improving sanitation
- Providing good ventilation

The death rate at Scutari fell from 40% to 2%. Nightingale wrote books about her methods (*Notes on Nursing*, 1859) and founded the **Nightingale School for Nurses** in 1860. Nursing became a respectable profession.

New hospitals were based on Nightingale's advice. They often followed a **pavilion plan**, with lots of windows for ventilation and **separate wards** for infectious patients.

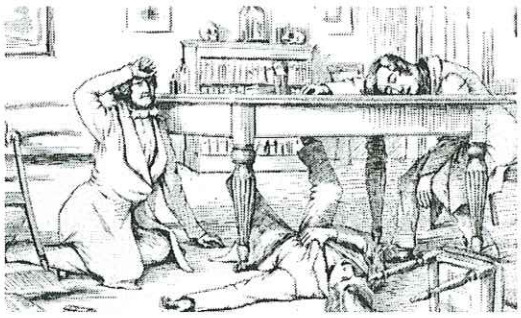
Nightingale's focus on clean air suggests that she still believed **miasma was** the key cause of disease.

- Surgery

There were 3 key problems with surgery: **bleeding, pain** and **infection.** Pain and infection were tackled during the 1800s, but bleeding continued to be a problem.

Anaesthetics *(Pain)*

Ether had been used as an anaesthetic in America, but it made patients vomit and cough. Doctors began looking for something better to numb pain.



In **1847**, Scottish surgeon **James Simpson** experimented with different chemicals and found that **chloroform vapour** was an effective anaesthetic.

Chloroform became popular, especially after Queen Victoria used it during childbirth in 1853.

However, there were some **problems**:

- An overdose could kill the patient.
- It sometimes affected the heart, causing perfectly fit people to die.
- With such an effective anaesthetic, doctors began to attempt **more complex operations**. This meant infection and bleeding became even bigger problems.
- Many people thought pain relief was intefering with God's plan, because procedures like childbirth were meant to be painful. Patients should be awake and screaming!

Antiseptics (*Infection)*

Before scientists knew about germs, patients would often survive operations, but then die from infections like **gangrene** and **sepsis**.

English surgeon **Joseph Lister** studied infected wounds and linked them to Pasteur's recently published germ theory.

Lister realised that if germs caused decay, then perhaps they also caused infection in flesh.

In **1865**, he treated a broken leg with a bandage soaked in **carbolic acid** (an antiseptic) to keep the wound clean. Lister also **sprayed** the acid during operations, to disinfect the air in the theatre. However, antiseptics were slow to catch on because:

- The science behind them wasn't understood. Lister focused on getting people to use the carbolic spray, not proving *why* it worked.
- Carbolic spray dried out the skin. Surgeons found it uncomfortable because it made their hands sore.

However, surgeons finally realised that cleanliness was important. By 1900, aseptic surgery (removing all germs from operating theatres *before* surgery) was commonplace:

- Surgical instruments were steam sterilised
- Operating theatres were cleaned
- Gloves, gowns and masks were worn by surgeons

- Other remedies

Many working-class people continued to use **herbal remedies,** often old recipes which had been passed down through generations.

People also bought **patent medicines,** which were mass-produced by big businesses. They were also known as **"cure-alls"** because it was claimed they could treat anything. These were usually made of lard, wax and soap, and had **no medical benefits**.

At the start of the 18th century only a few hospitals existed, since most had closed during the _____ in the 1530s. However, there was much progress in medical treatment by 1900. Hospital care was transformed by _____, who worked at a British army hospital in the Crimea in 1854. She published books on how hospitals should be run, and set up _____ to train more women into nurses. In 1847, James Simpson discovered an _____ to numb pain during operations, which was even used by Queen _____ during childbirth. In 1865, _____ successfully tested the first antiseptic, which aimed to reduce infection.

Despite these improvements, many poor people still relied on _____ remedies, and companies made big money by selling _____ which claimed to cure anything, but in reality had no medical benefits.

Approaches to Prevention

- Inoculation

In the 1700s **smallpox** was a major cause of death. One method of prevention was **inoculation** – this involved spreading pus from a smallpox scab into a cut in the skin of a healthy person, so that that person would catch a mild case of smallpox. The body would then build up a resistance to it, so the person did not catch it again.

This was risky because the inoculated person might get a strong dose of smallpox and die, or pass the disease onto someone else.

- Vaccination

In the 1790s, **Edward Jenner** noticed that diary maids who had already had cowpox (a disease similar to smallpox) did not catch smallpox.

Jenner experimented by infecting a boy with cowpox, then waiting a few weeks and trying to infect him with smallpox. The boy didn't catch smallpox. Jenner called this process **vaccination** (*vacca = Latin for cow*).

Vaccination was safer than inoculation because it used a **controlled dose**, and the vaccinated person couldn't spread the disease.

He published his theory in **1798**, and encouraged other doctors to follow his technique.

However, there was **opposition**:

The Church	Inoculators	The Royal Society
The Church felt that using animal infection in human trials was unnatural.	Inoculators and doctors were unhappy because vaccination destroyed the inoculation business. They lost money.	Jenner was a country doctor, not a famous London doctor. Many did not believe him. The Royal Society refused to publish his ideas.

In 1840 the government made inoculation a crime, and provided children's vaccinations at the taxpayer's expense.

In 1852 smallpox vaccination was made compulsory, though it wasn't properly enforced until 1872.

However, Jenner's discovery was a one-off – he couldn't explain exactly why it worked, so he couldn't use it to prevent other diseases.

Louis Pasteur developed the next vaccines, for chicken cholera, anthrax and rabies, in the 1870s. He published his **germ theory of infection** in **1878**.

Pasteur, in turn, inspired **Emil von Behring** to develop vaccines for tetanus and diphtheria in 1890.

- **Public health**

Before the 1800s, the government had a **laissez-faire** ("leave alone") attitude towards public health. They felt it was not their responsibility.

In 1842, **Edwin Chadwick** published his ***Report on the Sanitary Conditions of the Labouring Classes.*** It showed that poor people in cities had a much lower life expectancy.

Average life expectancy	professional trades	tradesmen	labourers
Rutland	52	41	38
Leeds	44	27	19
Liverpool	35	22	15
Manchester	38	20	17
Bolton	34	23	18

Chadwick compared life expectancy in northern cities with those in rural Rutland.

Chadwick suggested that local governments should be responsible for public health.

First Public Health Act (1848)

This encouraged local councils to set up a local board of health and provide clean water supplies. However, most councils **didn't act because it was not compulsory.**

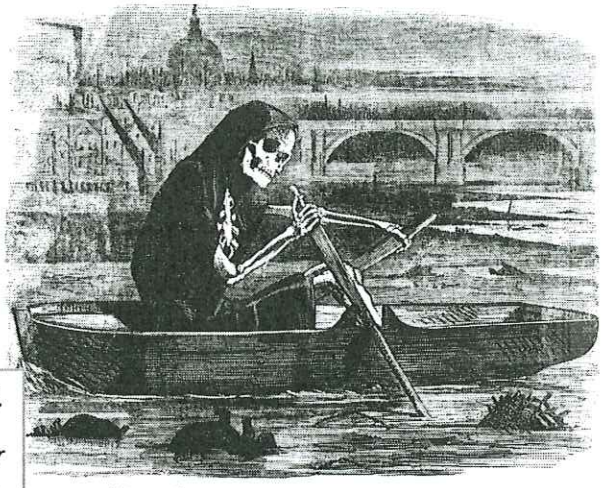
From the 1860s, the government began to take more action. Following the **Great Stink of 1858,** a modern sewer system was built in London by Joseph Bazalgette. In 1875, Parliament passed the second Public Health Act:

Second Public Health Act (1875)

The second Public Health Act made it **compulsory** for city authorities to:

- Provide clean water
- Dispose of sewage safely – not in the river!
- Build public toilets
- Employ a public health officer to monitor disease
- Enforce better building standards, to prevent overcrowding
- Check food quality in shops
- Provide public parks, for exercise

These measures had a positive impact – epidemics of major diseases decreased.



A cartoon about the Great Stink published in 1858.

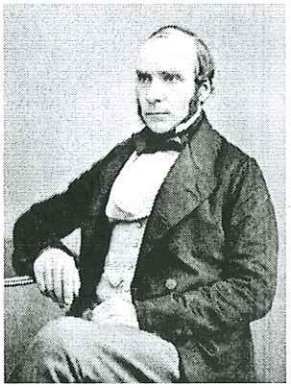
The government (and the taxpayer) was under pressure to spend money on improving public health.

Case Study: Cholera in London, 1854

Cholera was a fatal disease which caused severe sickness and diarrhoea. It first arrived in Britain in 1831 and there were several severe epidemics in the following decades.

- How did people try to prevent cholera?

  - Many thought it was caused by miasma, so tried to prevent it by cleaning up filthy streets.
  - The 1848 Public Health Act suggested that cities provide clean water supplies, but few did because it was not compulsory.



There was another serious epidemic in **1854**. A London doctor called **John Snow** theorised that it could not be caused by miasma. Instead, he thought it was spread by drinking **dirty water**.

- What did John Snow do?

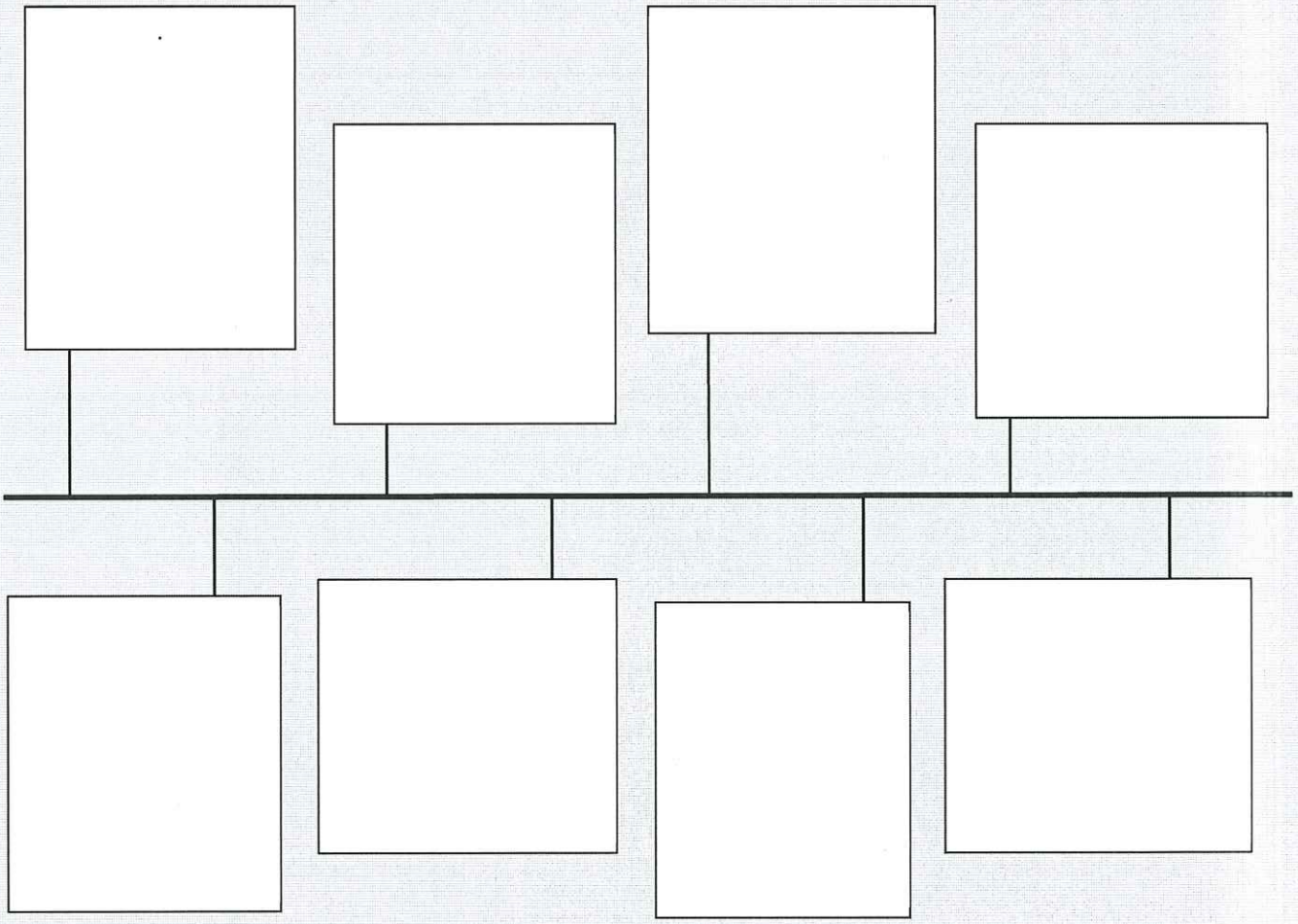
  - Snow created a map showing all the cholera deaths in his local area. The deaths seemed to be centred around the **Broad Street water pump**.
  - He removed the handle of the pump so that people couldn't use it, and the outbreak in the area quickly went away. This proved that the disease had been coming from the water in the pump.
  - It was later found that the pump had been contaminated by a nearby leaky cesspit.
  - Snow presented his findings to Parliament in 1855. He suggested that they invest in an improved sewer system.

- What impact did Snow have?

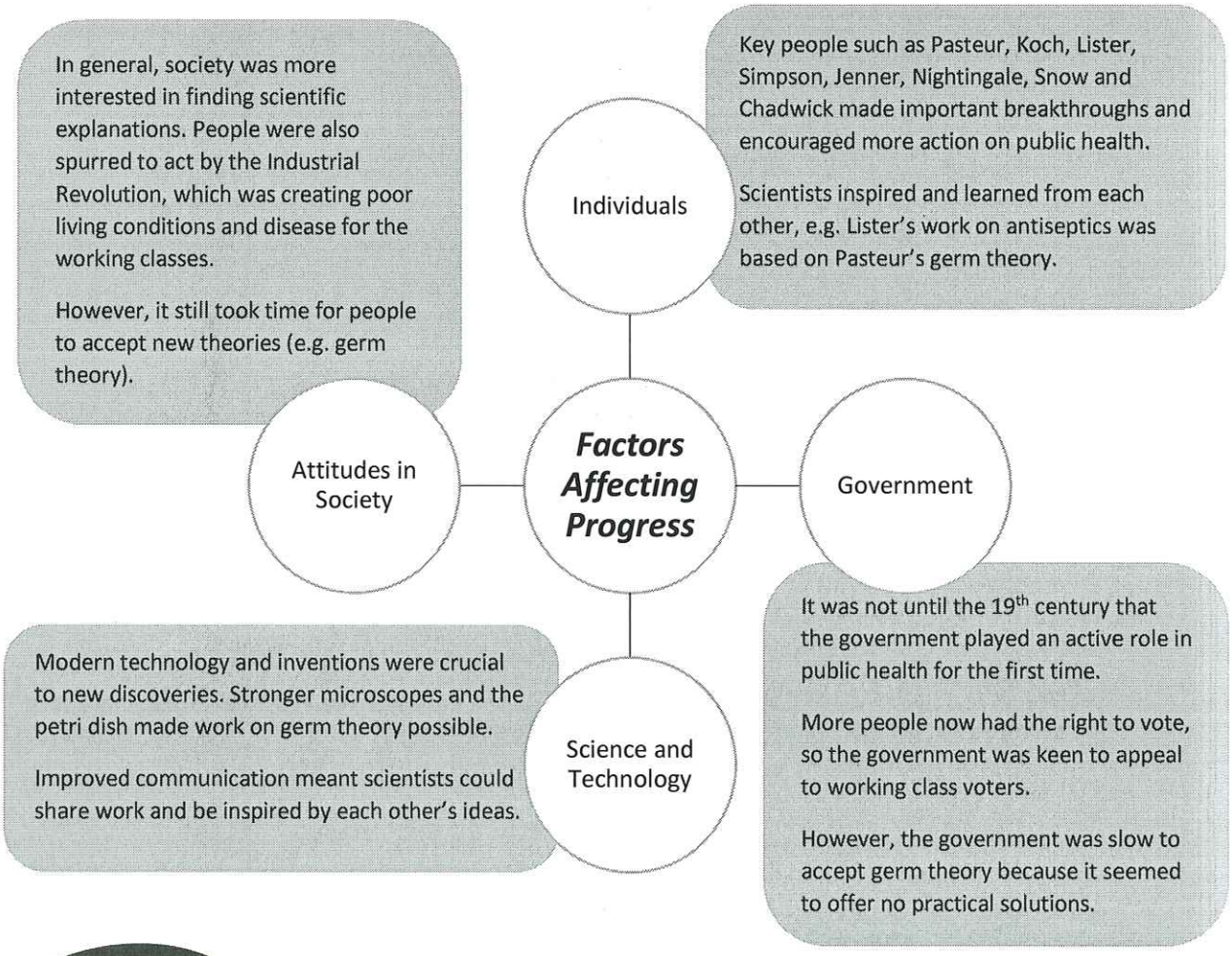
  - The government was willing to listen to Snow because he was a respected doctor. (It was Snow who had given Queen Victoria chloroform anaesthetic.)
  - The government did invest in a new sewer system - although it was the Great Stink of 1858 that really pushed them into action.
  - Many rejected John Snow's work because he had no scientific proof.
  - Snow's ideas were backed up by Pasteur's germ theory in 1861 – but Snow was dead by this time.
  - **Overall, Snow had an immediate impact on the Broad Street area, but his impact outside of this area was limited. The importance of clean water was not truly accepted until later.**

Put the following events in order on the timeline:

1. Edwin Chadwick publishes his report *On the Sanitary Conditions of the Labouring Classes.*
2. John Snow uses the Broad Street pump to demonstrate that cholera is spread through drinking dirty water.
3. Edward Jenner publishes his work on vaccination.
4. The government introduces the first Public Health Act, which includes non-compulsory measures for improving public health.
5. Louis Pasteur publishes his theory on infection, based on Jenner's earlier work.
6. Sewage in the Thames causes the "Great Stink" outside Parliament.
7. The government makes vaccination against smallpox compulsory.
8. The second Public Health Act is introduced, which forces local authorities to clean up their cities.



What Factors Affected Progress in the 18th and 19th Centuries?



QUICK SUMMARY

- By 1900, there was an improved understanding of disease thanks to the work of individuals like Pasteur and Koch on **germ theory**.
- Many old ideas about disease had died out, although some people still believed in **miasma**.
- More hospitals were built, and thanks to the work of **Florence Nightingale** they were cleaner and better equipped for treatment. Nursing became a respectable profession.
- Herbal and patent remedies were still popular because few new treatments had been developed.
- **Surgery** improved because of the development of **anaesthetics** and **antiseptics**, though bleeding was still a major problem.
- Edward Jenner developed the first **vaccine** for smallpox, and this eventually led to preventions for more diseases.
- In the 1800s the **government** began to take more action to improve public health in cities, which led to a healthier population.
- **John Snow** demonstrated that cholera was spread through dirty water in 1854, though it took time for this to be proven.

Topic Test - Theme 3: *Medicine in the 18th & 19th Centuries*

1. **What is meant by "The Enlightenment"?**

2. **What public health problems did the Industrial Revolution create?**

3. **What was "spontaneous generation", and why was it wrong?**

4. **What theory did Louis Pasteur put forward in 1861?**

5. **Why did Pasteur's theory have limited impact initially?**

6. **How did Robert Koch build on Pasteur's work?**

7. **Which old idea about the causes of disease was still widely believed in until the late 19th century?**

8. What did Florence Nightingale do to improve hospitals in the 1800s?

9. What were the 3 main problems faced during surgery? Which one had not been solved by 1900?

10. How did James Simpson discover the anaesthetic chloroform?

11. Whose theory was Lister's work on antiseptics based on?

12. What were patent medicines?

13. Name one advantage and one disadvantage of Edward Jenner's smallpox vaccination.

14. Whose 1842 report encouraged more action on public health?

15. Name 3 things set out in the 1875 Public Health Act.

16. What did John Snow discover in 1854?

17. Why did many people reject Snow's findings?

18. Name 4 things which influenced medical progress in this period.